REVIEWS.

Art. IX. *Precis d'Anatomie Pathologique.* Par G. Andral, Professeur, &c.

A Treatise on Pathological Anatomy. By G. Andral, Professor to the Faculty of Medicine of Paris, &c. Translated from the French by Richard Townsend, A. B., M. D. &c. and William West, A. M., M. D. &c. Two volumes, 8vo. pp. 698 and 808. Dublin, 1829.

The history of sound, scientific pathological anatomy, that pathological anatomy which has created a distinct era in our profession and is destined to form the ground-work of modern medicine, freed from loose conjecture and ingenious hypothesis, hardly dates beyond the labours of the present French school of contemporary writers. The *Chronic Phlegmasiæ* of Broussais, we consider as the efficient pioneer in subverting that vicious mode of considering and investigating disease which had been so long consecrated by time and authority. That work has not only brought us intimately acquainted with an obscure and important class of diseases which had been in a great measure overlooked or mistaken, but what is even of more importance, it also furnishes us with the first well-digested example of philosophical induction applied to the investigation of disease, by strictly connecting the morbid alterations of structure found after death with the various symptoms the disease exhibited in its progress, from its commencement to its termination, and at the same time duly estimating the agency of the different causes, as well external as internal, that may have been instrumental in the production or modification of the pathological condition. The *Chronic Phlegmasiæ*, it is true, was preceded a short time by Prost's *Médecine eclairée, par l'observation et l'ouverture des corps*, which appeared in 1804, and Corvisart's *Essay on the heart*, published in 1806. Yet these works, although admirable specimens of sound pathological research, as are also Bayle's *Researches on Phthisis*, which appeared in 1810, only two years after the Chronic Phlegmasiæ, seem to have exerted no material influence in leading physicians to the study of morbid anatomy in the spirit that has since distinguished the modern French schuol.

With more justice perhaps we might go one step further back. To Bichat, in strictness, belongs the merit of having laid the foundation

of this improved method of investigating disease. Even Broussais acknowledges that his system of doctrines is the legitimate offspring of the *Anatomie Générale*, nor have others denied their many obligations to its immortal author. It was not however permitted to Bichat to follow out to any extent his own principles in their application to pathology; for his *Pathological Anatomy* cannot be viewed other than as an earnest of what might have been expected, had not death arrested him in early manhood amidst his brilliant career.

If we go further back we shall find little to compare with the science of the present day. Bonetus, towards the close of the seventeenth century, (1679,) undertook the laborious task of collecting the innumerable observations of pathological facts that had been made since the revival of letters, which may be considered the birth-time of the science, and of presenting them in a systematic form as a summary of what was then known on the subject. Although his work exhibits great and glaring faults, incident to the imperfect cultivation of the science in those early times, and a mass of confused and contradictory doctrines that were then prevalent, it every where evidences extensive erudition and an enlightened observation, and is not wholly worthless even at the present period when sounder views prevail.

Morgagni's great work, *(De sedibus et causis morborum per anatomen indagatis*, 1766–7,) however he may have severely criticised the labours of his illustrious predecessor, is not altogether free from the same faults, and exhibits besides a prolixity that would be quite insufferable, were it not for a certain quaintness of manner that keeps the attention awakened by its novelty. Still it possesses higher claims to distinction than the *Sepulchretum:* it connects the organic lesions with the attendant symptoms more clearly than had been done before his time, and sometimes traces them to their respective causes with a perspicuity and a cogency of reasoning that even at this day calls for our admiration. The work was undoubtedly at the time of its appearance, and for many years after, a valuable acquisition to the profession, as a vast repository of authentic facts—a sort of anchoring place, where the mind could rest upon something positive and demonstrative as far as it went, if not always entirely satisfactory, aside from the thousand ingenious speculations and idle theories that for the most part engrossed the attention of physicians.

The *Historia Anatomico-medica* of Lieutaud, (1776–81,) is the next work of importance after that of the learned Italian, but in every respect inferior to it. Its arrangements are extremely loose and imperfect, the cases curtailed and often without definite object, and the

whole forming a medley that will not often be consulted at the present time.

Dr. Baillie's work, considering the time at which it appeared, toward the close of the eighteenth century, is exceedingly defective. It exhibits little of the laborious research of Morgagni, or the sagacity of his great relative, Hunter, and none of that spirit which characterizes the productions of the present day. It is concise in its delineations, and, if we may be allowed the expression, its sketches of the morbid alterations as revealed after death, hold no very intimate relations with the symptoms exhibited during the course of the disease, and the whole resembles rather a *catalogue raisonnée*, or a science of pure curiosity, than an investigation into the character and causes of disease.

Many authors succeeded these great men, who pursued their pathological researches in the path traced out by Morgagni, but none of them have left works that claim particular mention in this cursory survey. If such are the imperfections of the works that were universally esteemed the great classics in pathological anatomy before the appearance of the *Chronic Phlegmasiæ* in 1808, how very far below that admirable work and its numerous successors must we place them, in comparing their desultory and heterogeneous mass of ill-arranged facts, with the concision, minuteness, accuracy of detail, and systematic form that the science has attained within a few years in France. It would lead us too far from the object we have now in view to notice even succinctly the most remarkable of these works. Together they constitute a body of fact and doctrine that is rapidly giving to the healing art the stability of a science, and to the practitioner surer and more palpable principles of conduct at the bed-side of sickness. Whoever therefore shall wish to make himself acquainted with a pathology based on correct notions of healthy and morbid structure, and of the vital phenomena of the economy, must apply himself to the study of the works of such men as Broussais, Louis, Laennec, Gendrin, Andral, and Cruveilhier. Before passing on, we will merely mention, for we cannot afford the space to enter fully into the subject on the present occasion, that the French pathologists are divided into two sects. The one, at the head of which stands Broussais, profess to be the legitimate interpreters of Bichat's views, by connecting the morbid alterations with the vital laws of the economy, and studying to appreciate the influence of causes in their production and development. Their researches, directed in this spirit, have given birth to a system of doctrines now well known as the physiological medicine. The other sect, numbering among its ardent

supporters, Bayle, Laennec, Dupuytren, Cruveilhier, and Bieschet, study morbid structure apart from the vital actions of the system, and endeavour to found a system of medicine on the different organic lesions appreciable in the body after death. In commending so highly the labours of the French school, we would not however wish to be considered as inferring that other countries have remained all this time idle spectators of their progress. We know it to be otherwise. Of modern German and Italian science, we know too little to be able to speak with much precision; but in Britain of late something has been done, and is still doing, in aid of this improved condition of the science; and in comparing the present state of pathology with what it was but a few years back, we must not forget to appreciate, as having contributed to bring about the present state of things, the labours of Abercrombie, Hodgson, Farre, Armstrong, Bright, and a few others. *Rari nantes in gurgite vasto.*

Of the many works on pathological anatomy in France within the period designated, not one of them has excited a higher interest or been more frequently quoted with approbation than the *Clinique Médicale* of Andral. It soon placed its author in the first rank of pathologists, and at the head of the anatomico-pathological school of France. Our own opinion of its merits and defects were succinctly given in the last number of the Journal, in remarking on the translation of Broussais' *Chronic Phlegmasiæ*, and we need not advert to the subject again in this place. How far his second performance, which it is our business at this time to introduce to our readers, will maintain the same permanent reputation, may perhaps be matter of doubt. The almost daily accession of researches on morbid anatomy, and the advancing triumphs of a science he has himself so efficiently contributed to bring to its present state, will not allow a summary of pathological anatomy, even by Andral, long to keep its ground undisputed; though in our opinion it is the ablest systematic treatise on the subject that has yet appeared. It is more comprehensive than either Gendrin's or Cruveilhier's work, and is based on more modern data than Craigie's *Treatise*, the only works we are acquainted with that can be placed in competition with it. For Lobstein's *Treatise* is not sufficiently advanced to enable us to form a decided judgment of its merits, and Rilbes, (see his *Anatomie Pathologique appliqué aux Maladies,)* is too deeply involved in the mysticisms of the doctrines of Barthez and the Montpellier school, to permit him to write with profit for the present age. With Meckel's work we are unacquainted, but we suspect it does not sustain so high a rank in Europe as his other productions. We may therefore fairly look up to Andral's

treatise as likely to become the text-book of physicians in this department of science for some time to come; with what advantage, our readers may perhaps form some idea from the analysis we shall endeavour to give of its prominent doctrines and general principles.

The work is divided into two parts sufficiently distinct. The first treats of *general pathological anatomy;* in which the principles that apply to lesions in general, their external form, intimate structure, and mode of production, are considered. In the second, these principles are applied to each of the organs of the system respectively, and the different derangements of each are investigated, which constitute the department of *special pathological anatomy.*

Andral banishes almost entirely from his work the term inflammation, as an antiquated expression, only calculated to render the language of the science vague and confused. He views the term as describing a complex morbid state, which he divides into its elements, treats of each of them separately, and endeavours to appreciate their presence and influence in the different lesions that occur in the system.

The elements of all morbid alterations are comprehended under five heads; lesions of circulation, of nutrition, secretions, of the blood, and of innervation. This system of pathological alterations is founded on the following data. The three phenomena of circulation, nutrition, and secretion, are considered to constitute the fundamental principles of organization common to vegetables and the lower order of animals; but in man, and the higher order of animals possessing a nervous system, a fourth phenomenon is superadded, which exercises a powerful influence and control over the others, denominated innervation. Finally, since all the materials of nutrition and secretion are derived from the blood, the qualities of this fluid must exercise a very material influence over the functions of nutrition and secretion, and the well-being of every part of the economy requires the proper constitution of this circulatory mass. The pathological classification rests on these principles, and are succinctly stated in the subjoined extract.

"The human body, considered in the state of disease, presents only various modifications of those actions which have already been enumerated as essential to man in health. Thus,

"1. The supply of blood usually received by an organ in the healthy state of the system may be altered in its quantity; from such alterations arise the *lesions of the circulation.*

"2. The component particles of the different solids are liable to various alterations in their arrangement, their number, their consistence, and their nature; hence arise the *lesions of nutrition.*

"3. The different secretions which are separated from the blood in the parenchymatous structure of the organs, or on their surface, may be altered either in their quantity, or in their quality; and hence the *lesions of secretion.*

"Moreover, inasmuch as the state of the nervous system, and the composition of the blood, exert a powerful influence over the capillary circulation, nutrition, and secretion, in the healthy state, it is evident, that as they continue to exert the same influence in disease, many of the derangements of these actions must proceed from various alterations of innervation and sanguification.

"In conformity with these views, I propose dividing into five sections the various morbid alterations to which the human body is liable.

- SECTION I. Lesions of Circulation.
  - Increase of quantity of blood.
  - Diminution of quantity of blood.
- SECTION II. Lesions of Nutrition.
  - Alterations of the arrangement of the elementary particles.
    - Malformations.
  - — of their number.
    - Increase.
      - Hypertrophy.
    - Diminution.
      - Atrophy.
      - Ulceration.
  - — of their consistence.
    - Softening.
    - Induration.
  - — of their nature.
    - Transformation.
- SECTION III. Lesions of Secretion.
  - Alteration in the quantity of the secretions.
    - Increased quantity.
      - Effusion.
      - Flux.
    - Diminished quantity.
  - — in their situation - - -
    - Development in an unusual situation. — In substance.
    - Translation to an unusual situation. — In elements.
  - — in their qualities - - -
    - The natural secretion modified in its composition.
    - A new secretion.
- SECTION IV. Lesions of the Blood.
  - Alterations in the Physical properties of the Blood - - - - - — Primitive.
  - — of its Chemical properties - — Primitive.
  - — of its Physiological properties — Consecutive.
- SECTION V. Lesions of Innervation.
  - Primitive.
  - Consecutive."

Lesions of the Circulation.—These lesions are divided into two principal classes. In the first, *hyperæmia*, the quantity of blood in the capillary system is preternaturally increased. In the second, *anæmia*, it is diminished in quantity.

Hyperæmia is subdivided into four species:—1. Active or sthenic. 2. Passive or asthenic. 3. Mechanical, from venous obstruction. 4. Cadaveric, from physical laws, after vitality is extinguished.

1. *Active Hyperæmia.*—Some local congestions are perfectly compatible with a healthy state of the system, as those arising from moral emotions and violent exercise. Others again, though nut amounting to disease, as redness from heat, or a slight irritation, cannot be considered as healthy phenumena. These conditions pass by insensible gradations intu a pathulogical state, and in like manner also into inflammation. In order fur these congestions to take place it is not necessary that there should be an undue quantity of blood in the system, for they frequently occur in debilitated individuals, whose blood is neither abundant in quantity, nor rich in quality. When a hyperæmia occurs in one organ, there is a strung tendency to form secondary congestions in other organs closely connected with the affected part; while, in other instances, by a law of cumpensatiun, other organs are deprived of their healthy proportion. It is the characteristic of some diseases to produce uniformly a simultaneous congestiun in two or more organs, as the measles, scarlatina, and typhus, and pestilential fevers arising from the introduction of a deleterious principle into the circulation. Not only so: the hyperæmia may exist in every organ of the body at the same time, from the general capillary system being overloaded with blood, and the whole system in a state of plethura. Under the influence of this general state, serous effusions, unaccompanied with inflammatiun, take place into the cellular tissue and into the different serous cavities. These effusions seem to arise simply from the mechanical effects uf the over-distention of the vessels, and are the active dropsies of authors which require the use of bleeding and uther evacuants for their removal. Also this general hyperæmia, from the excessive supply of blood, and the general excitation induced, sumetimes produces, through the associating medium of the sympathies, a general inordinate reäction; in consequence of which the phenomena of fever are fully developed, constituting, in its moderate grade, the simple continued fever of authurs. But when the intensity uf the reäctiun of the different organs is great, it gives rise to alarming nervuus symptoms, adynamia, &c. And, finally, it is converted from a general into a local affection, when the reäction centres itself un some one organ. Occasiunally these congestions, especially in tissues that have undergone some morbid alteratiun of structure, assume an intermitting type, and in this way organic lesiuns, that would utherwise escape detection, are revealed. The only appreciable modification that simple hyperæmia exhibits is change of colour. This alteratiun is often produced by an increased quantity uf blood circulating in the part, but on other uccasions proceeds from the gradual accumulation of this fluid, which

is retarded in its course, and eventually becomes perfectly stagnant. The experiments of Broussais, Wilson Philip, Hastings, and Gendrin, show that there are several degrees of hyperæmia. In the first, the vessels are contracted, and the circulation accelerated; in the second, the vessels dilate, the blood circulates more slowly, its particles tend to coalesce, and seem disposed to coagulate; and, finally, in the third, the blood becomes perfectly stagnant, the part assumes a deeper brown, and at last becomes quite black.

It does not seem to us that the causes of hyperæmia, its mode of action, and influence in producing disease, are examined very satisfactorily or ably. Indeed, in investigations of this nature the author falls very far short of that rigid scrutiny and comprehensive survey of details which characterize the physiological physicians.

2. *Asthenic Hyperæmia.*—This is the result of diminished tone of the capillary vessels which no longer possess the requisite force to propel forward the blood as fast as it is received, and is often consecutive to the active form on the subsidence of the original irritation leaving the vessels permanently dilated. It is essentially different from inflammation: indeed, *passive inflammation* is a manifest contradiction of terms, and can have no existence. The violet blotches that frequently occur on the legs and feet of old persons is of this kind, and it is frequently the cause of gangrena senilis in such persons, by the arrest of the blood in the capillaries of the feet allowing it to coagulate and obstruct the circulation. It takes place also in scurvy, in the last stage of malignant fevers, convalescence from pulmonary disease, &c.

3. *Mechanical Hyperæmia.*—This term comprehends the sanguineous congestions formed during life by an impediment to the free course of the venous circulation, which a mechanical obstacle presents to the return of the blood from the capillaries. The alterations induced are, 1, change of colour; 2, morbid exhalations; 3, modifications of size and consistence of the parts affected.

"The alteration of colour which accompanies every mechanical hyperæmia, results exclusively from the accumulation of blood in the capillary vessels, and may be either bright red, violet, or brown, more or less deep in shade. In the first stage of this affection, the congestion is confined to the veins of considerable calibre; the transparency of the tissues is not affected, nor is their natural whiteness altered, except where those veins apparently varicose are distributed. In a second stage, veins of a less calibre become congested, and if the tissue affected be membranous, several minute vessels are observed ramifying in an arborescent form on its surface; if the seat of the hyperæmia be a parenchymatous organ, an unusual quantity of blood issues from the part when pressed or simply divided. Thus, in such a case, the brain, when sliced, presents nu-

merous red points; which are nothing else than the divided orifices of the congested vessels; while a section of the liver presents an uniform red appearance, &c. Lastly, in several parts of the cellular tissue, which is interposed between the different organs or parts of the same organ, a number of minute vessels filled with blood are seen ramifying in every direction; in such cases, the cellular sheath of the arteries is sometimes beautifully injected, and the vasa vasorum admirably displayed. In a third degree, the most minute vessels become injected, and are so distended that they appear literally to touch and crowd each other; the tissue thus mechanically congested presents an uniform red, brown, or even black colour.

"When the mechanical hyperæmia is carried to a certain extent, other phenomena may arise as its consequence. Thus, the serous portion of the blood, or even pure blood, may escape from the over-distended vessels, just as water or any other liquid transudes through the permeable sides of a vessel in which it suffers compression. To this source are to be referred several hæmorrhages and dropsies produced by simple transudation in a tissue mechanically congested; and although these effusions have really nothing active in their nature, yet are they considerably diminished, and sometimes altogether removed, by blood-letting, which in such cases acts in a manner purely mechanical, by removing from the vessels the fluids by which their parietes were kept in a state of over-distention. These pathological observations are well exemplified in the majority of those cases of hæmoptysis, hæmatemesis, ascites, and other effusions which are connected with organic disease of the heart."

4. *Cadaveric Hyperæmia.*—The congestions that take place after death, are various in their cause, appearance, and seat, and are liable to be confounded with vital alterations. The empty condition of the large venous vessels will generally distinguish them from such as arise from mechanical obstructions during life. When produced at the moment of death, they arise from the contractility of the tissue of the small arteries acting after the cessation of the heart's action; but when they take place some time after, they may be caused by dependant position, by transudation of fluids through the parietes of vessels, and by chemical affinities.

All these different species of congestions are liable to give rise to the escape of blood from its vessels, and its effusion either on the surface of the membranes, or into the cellular and parenchymatous texture, even after death. Hæmorrhage may almost be considered one of the natural terminations of active hyperæmia, although we can assign no reason why it should occur in some cases, and in others produce pus, serous effusion, induration, softening, or ulceration; but they are all doubtless connected by one common link, as they occur under apparently the influence of the same causes. Boerhaave's experiment of tying the vena portæ, and hæmoptysis from aneurisms of the heart, show the capacity of mechanical obstacles of the circulation to produce hæmorrhages. All hæmorrhages, however,

do nut depend on increased vascular actiun. Some arise exclusively from some modification of the organic disposition of the coats of the vessels allowing the blood to escape, and others again arise from an impoverishment of the blood, as in scurvy, general debility, and the sequelæ of profuse hæmorrhages. Other instances of hæmurrhages from passive congestions have already been noticed.

Anæmia.—This is the reverse of hyperæmia, and the organ affected contains a less quantity of blood than circulates through it in a healthy state. It is more or less complete, and may be local or general. In the local anæmia the calibre of the artery is very commonly less than natural, which may exist either as cause or effect. Sometimes the organ is merely paler than in a state of health; in other cases it is diminished in bulk, its texture softened, and its secretions in some few instances preternaturally abundant. *General anæmia* may supervene without appreciable cause, but most usually it may be traced tu the use of fuod not sufficiently nutritive, and the habitual respiratiun of a moist impure air in places excluded from the free admission of the sun's rays, ur to smne organic lesiun which affects the process of hæmatosis. It sometimes succeeds to profuse hæmorrhages, or indeed may proceed from any cause which diminishes the general mass of blood, or hinders its due supply. Its most ordinary furm is the chlorosis of young females, where it seems to arise from a deficient hæmatosis.

Lesions of Nutrition—The function of nutrition is liable to various modifications; 1, in the arrangement and distribution of the elementary molecules in the several tissues, constituting monstrosities; 2, in the number of the molecules, constituting hypertrophies or atrophies; 3, in their consistence, constituting indurations ur softenings; 4, in their nature and properties, constituting transformations of une tissue into another.

Monstrosities.—These are congenital aberrations of nutrition, which produce a conformation of one or more organs, different from that which naturally belongs to the species or sex of the individual. Littre first advanced the idea, that a certain number of these mnnstrosities, was the result of an arrest or suspension of the progress of the development of the fœtus, and those cases which do not arise from any such suspension, have nevertheless been reduced tu certain determinate laws in their aberrations. They may all be referred tn two classes, viz. viciuus conformations, generally congenital, and alterations of structure, seldom occurring until after birth.

"The development of the fœtus may be modified in various ways: sometimes the formative process, or nisus formativus, as it has been termed, possesses less

energy than natural, and the development of the organs is in consequence suspended, in which case they are found either imperfectly formed, or altogether deficient; sometimes, on the other hand, this force seems to acquire an excess of energy, and then there is a corresponding excess of development, and the organs exceed their natural limits, either in size or number. In other cases again, the development cannot be properly said to be excessive or defective; but the formative purpose appears to have been simply perverted, thus producing various modifications in the direction and situation of the organs. We have examples of this in the general transposition of the viscera, and in certain varieties in the origin of the principal arteries."

"Whatever be the nature and number of these malformations, the implicit obedience to certain laws which nature constantly observes in the midst of these apparent anomalies, is very remarkable. Thus, the situation of the organs has never been so perverted, that the lungs were placed in the skull, or the brain in the pelvis; nor have the organs been observed so confounded together as that the alimentary canal, for instance, made a continuous tube with the aorta, &c.; all of which would no doubt occur, if certain laws did not still preside over this state of apparent disorder and confusion. Another illustration of the existence of these laws is, that man and the higher orders of animals, may present such an arrest in their development, that several of their organs shall represent exactly the natural state of these parts in the inferior animals; whereas the latter can never attain such a degree of development, as that their organs shall resemble the corresponding parts of the higher orders. Thus, for example, the human brain, arrested in its evolution, may present an appearance more or less exactly analogous to the brain of fishes or reptiles, but the simple brain of these animals can never attain the degree of complicated structure which the human brain presents. Several malformations may exist together in the same individual; indeed, such is perhaps the most frequent case, whenever the deformity is at all considerable. Sometimes these various malformations are all of the same class; or in other words, are all produced by the same cause, for instance, by an excess or a deficiency of development. Such vices of conformation constitute the *compound monstrosities* of Meckel; while his class of *complex monstrosities* comprehends all those which result from the existence in the same individual of malformations belonging to different classes.

"The complex monsters, in Meckel's acceptation of the term, are the most common. Several of them result from the law so ingeniously conceived by M. St. Hilaire, which establishes that the exuberance of nutrition in one organ involves to a partial or less extent the total or partial atrophy of some other organ, and *vice versa*. Innumerable applications may be made of this law of compensation, as it is termed, to the study of monstrosities. Thus, in several individuals who have on one hand or foot, supernumerary fingers or toes, the hand or foot of the opposite side has fewer than ordinary."

Monstrous formations from excess or deficiency of development, occur much more frequently in external parts than in internal organs, but irregularity of form much more frequently in those organs which are principally supplied by the great sympathetic, than such

as derive their nerves from the cerebo-spinal system. Female monsters are more frequent than those of the male sex. Of eighty monsters examined by Meckel, sixty were females and only twenty males. This excessive proportion of females may be attributed to the fact, that in the early stage of fœtal life there is but one sex, the female, and that the genital organs are most commonly arrested at an early period of their development. The hereditary nature of certain malformations is established by many curious facts, but we regret that our limits will not permit us to go further into this subject which our author treats with learning and ability.

Hypertrophy.—This is an increase of the constituent molecules of a solid, commonly arising from the exuberance of the nutritive powers of a part, and should be restricted to those cases where the tissue retains its natural structure and organization. This affection is to be studied in the several elementary tissues, and in the organs formed by a combination of these tissues. A part hypertrophied acquires a greater degree of firmness and density, with increased bulk; and where the tissue naturally presents a certain degree of density, it often assumes a dull white or grayish colour, with a degree of hardness approaching to cartilage, or a substance resembling the interior of a turnip. It is this kind of alteration of the cellular tissue, when it occurs in laminated or rounded masses, which has been denominated *scirrhus*, and in other cases *encephaloid*, from some rude resemblance to cerebral substance. The serous membranes, which are a peculiar form of cellular tissue, have never been found to exhibit this exuberance of nutrition, though its subjacent tissue frequently has. The tegumentary tissues, both mucous and cutaneous, are on the contrary often affected. In a case of this sort the cutaneous covering exhibited distinctly a regular order; 1, the corium; 2, the papillæ; 3, the internal white layer; 4, the rete mucosum; 5, the horny layer; 6, the epidermis of which the skin is naturally composed. Little is known of the tendency of cartilage to become hypertrophied, but the fibrous, osseous, nervous, and muscular systems frequently present this alteration. The minute vessels that convey the blood through the various tissues, occasionally acquire an unusual development, and present the appearance of vegetations clustered together, not unlike polypi, in others resembling the spleen in texture with its areolæ gorged with blood, and in others again forming an accidental erectile tissue. The size of an organ is not invariably increased in this affection, for while one of its tissues only is hypertrophied, the others may fall into a state of atrophy, and thus even cause a diminution in the bulk of an organ. Irritation or excessive nutrition is not the sole

cause of this disease; the assimilating powers may remain in their natural condition, and the powers of disassimilation be decreased, and produce the same effect. The existence of such a cause accounts for the good effects sometimes obtained from the use of stimulants, as iodine and mercury, in their treatment. A third kind may depend upon an alteration of the function of nutrition generally, as seems to be the case in scrofula.

Atrophy.—This state is produced, 1, by diminished supply of blood; 2, by diminished nervous influence; 3, by the suspension of the function of the part; 4, by imperfect sanguification; and 5, by irritation. This last cause operates indirectly from the law of compensation, some other tissue or organ labouring under increased activity of nutrition. While in hypertrophy the part commonly receives an increased supply of blood, in this affection it is diminished. So also are its characters the reverse of the former; the volume of the part is lessened, if a membrane, thinned, its texture generally softer and paler than natural, and it is not unusual to have an undue quantity of fatty matter deposited around it.

Ulceration.—This is a solution of continuity in a tissue produced by absorption of its molecules. It is preceded, 1, by a state of hyperæmia, most commonly sthenic; 2, by different alterations of nutrition, as chronic indurations of cellular tissue ending in ulceration, and then usually termed *cancer;* 3, by morbid secretions, which, by a law of the economy to accomplish their evacuation, thus open a way to the exterior; 4, by gangrene, which calls for a separation of the dead from the living part. The ulcerative process depends on certain special conditions, which reside neither in the intensity nor the duration of the irritation, and in many cases is not the result of a local affection, but rather an indication of a general morbid condition, as in scorbutic and scrofulous affections.

Induration consists in an increase of the natural consistence of the tissues, without other alteration of their texture. It may result from an alteration in the nutrition of the solid particles, both as a physiological change in the progress of age, and as a morbid production at any period of life; and finally, it may depend exclusively on a modification of the fluids. Pulmonary hepatization is an instance of the latter species, although its morbid texture is preternaturally friable. The induration of the cellular tissue, (skin bound,) of new-born infants, is an instance of the same kind, which doubtless arises from an alteration of the qualities of the fluids exhaled into the cells of the tissue. Perhaps, indeed, the production of scirrhus may be owing to the same kind of effusion of concrete albuminous matter into the

areolæ of the cellular tissue. Often the induration is caused by the conjoint alteration of the solids and the fluids, as around old ulcers. Parts indurated, present very different appearances in form, size, and colour. Sometimes they are pale; in others red, gray, brown, or black. Sometimes their volume is increased, in others diminished, especially when they depend on a condensation of the fluids. Irritation is one of the most constant elements in the production of this affection; but in some instances there is no proof of its existence, and moreover is not of itself sufficient to account for its production.

Softening.—This is a diminution of cohesion of the different elementary tissues, and there is scarcely an organ in the body which has not been shown to be subject to it. Sometimes it affects only one tissue of an organ, as the cellular tissue, that connects together other textures; one of the layers of the mucous or cellular membrane, &c. and in other cases it affects indiscriminately the whole texture of an organ as well as the fluids it contains. It may exist in different degrees, either leaving the solid texture of its natural consistence, but more easily torn or broken down, or the whole reduced to a pulpy mass; or finally, the original structure so altered as to present no appearance of organization. These alterations exhibit very different characters, both as it respects colour and bulk. Sometimes the parts retain their colour, in other instances they are pale and blanched, milky, white, gray, and red; and their bulk increased, diminished, or natural. While induration is almost invariably a chronic form of disease, this affection may be either acute or chronic. This alteration doubtless depends on a modification of nutrition, but what its uniform proximate cause may be, is not ascertained, for, although active hyperæmia is the most constant and striking phenomenon which precedes it, we cannot consider it to be the sole efficient cause, as it is not invariably present; and besides, in some instances, the existence of an irritation or of inflammatory action is wholly incompatible with the condition of the attendant phenomena. Weakened energy of the vital and nervous powers, we are disposed to consider as the efficient cause of all those varieties which occur in sickly, cachexic infants, whose sum of vitality is actually below the natural standard; also in old decrepid persons, in adults affected with scrofula, rachitis, or scurvy, and in persons of all ages exhausted by chronic diseases, or by food not sufficiently nutritive, as in the animals experimented upon by M. Magendie, where softening of the corneæ was seen to follow protracted abstinence from proper food.

Transformations.—Here the nutrition of a tissue is so modified as to change its nature, and convert it into a totally new form. This

law of transformation of one tissue into another, is one of the most universal facts which organized beings reveal, both in a healthy and morbid state; but all tissues are not equally liable to it, neither does it take place in the same manner in them all. As the cellular tissue was the original matrix of all the others, so they are all susceptible of being reconverted into it. On the other hand, all the tissues except the nervous, and it also where nerve originally existed, may be produced indifferently in the cellular texture, and the nature of the transformation is determined by the nature of the function it is accidentally called upon to fulfil, as cartilage where elasticity is required, and a serous membrane where great friction is called for. Divided tissues are reünited in sôme instances by the same tissues; in others by different ones, and they are all susceptible of such transformations as take place during the evolution of the fœtal state, or in other animals. Thus cartilage may be converted into bone, but never into mucous membrane, and the muscular may be changed into the fibrous, but not into any other. Finally, every tissue, when reduced to a state of atrophy, especially if the function of the part cease, tends to resolve itself into its original cellular tissue. In many cases the first phenomenon which presents itself to our notice, in a part where the transformation is subsequently to take place, is a degree of excitement, attended with more or less sanguincous congestion; in others there is no such indication present, and we are forced to consider the change merely as the result of an aberration of the natural nutrition, without being able to assign its precise cause. The transformation of cellular tissue into serous membrane is a common occurrence, not only from inordinate motion in a part, but also in the parenchymatous substance of organs, in the form of cysts, containing various substances and secretions, which, in some instances, are anterior to the formation of the membranc, as where they contain a coagula of blood, and in others posterior, as where different secretions are contained in multilocular cysts. The transformation of cellular tissue into mucous membrane is rather a rare occurrence. It however constitutes the parietes of old fistulæ of some internal ulcers, without external communication, and sometimes even replaces portions of mucous membrane destroyed. When skin is destroyed, it is regenerated incompletely, being generally composed of corium, and of epidermis only, and a mucous membrane, on being long exposed to the air, takes on an appearance resembling skin. One of the morbid growths which is most evidently formed at the expense of cellular tissue, is fibrous structure in different states of perfection, from cellulo-fibrous tissue to true ligament, and these productions are not unfrequently in turn con-

verted into cartilaginous and osseous transformations, or end in cancers. Muscles, from long cessation of their function, sometimes also are transformed into mere fibrous structure. Cartilaginous transformations are as common as the fibrous, and occur under almost the same circumstances; in many cases they succeed to them. They are found in cellular tissue, in parenchymatous organs, and loose in serous and synovial cavities. It is exceedingly rare to find any tissue, except the cellular, undergoing a real transformation into cartilage. Thus, although we constantly observe the formation of plates of cartilage, immediately under the serous membranes, there is no instance on record, in which the serous membrane itself has been converted into that substance, and where these plates are found on the surface of the liver, spleen, between the layers of the pericardium, between the dura mater and arachnoid, or between the internal and middle tunics of the arteries, the membranes themselves invariably remain intact. The cellular tissue, subjacent to the mucous membranes, is sometimes, though rarely, transformed into cartilage; and perhaps also these membranes themselves, at any rate Laennec records an instance of it. The osseous tissue may likewise undergo this modification of its nutrition from a deficient supply of its calcareous matter; but there is no well-authenticated account of this transformation occurring in the muscular fibre. The osseous transformation is almost exclusively confined to the cellular, the fibrous, and the cartilaginous. If we trace the formation of the human skeleton from its earliest period of development in the fœtus to extreme old age, we shall find the fibrous, and still more the cartilaginous tissues presenting a constant tendency to ossification. The same parts and structures which we have said are most liable to cartilaginous transformation, will be found subject to the osseous in the same proportion. Certain cartilages and fibrous structures are especially prone to this transformation; it is even through them, as an intermediate form, that it is frequently produced, and fractured cartilages are in general reünited by a hoop of osseous matter, which is formed at the expense of the perichondrium.

Lesions of secretion.—The blood, in circulating through the system, is submitted to three species of elaboration. In the first, denominated nutrition, the molecules are acted upon by the plastic power which presides over the formation of tissue, and are appropriated to form a part of the animal structure. In the second, the albuminous matter, in a state of liquid or vapour, is constantly poured out throughout every part of the system, on all the cutaneous, mucous, and serous surfaces, as well as in every areolæ of the cellular tissue. In the third species, the elaboration takes place in certain

organs, exhibiting various degrees of complication of structure, from that of a simple follicle to that of the liver or kidney. Heretofore we have treated only of the first species of lesions of nutrition, and found them to consist in various alterations in quantity or quality of the molecules which compose the different tissues. It now remains for us to treat of the lesions of the other two, which may be divided into four classes. 1. Secretions morbid in quantity. These constitute when retained, *effusions*, when eliminated, *fluxes*. 2. Natural secretions occurring in parts that are not destined to form them in their healthy state. 3. Secretions morbid in quality, which differ more or less, or altogether in properties from the natural secretions of the part; and 4. Morbid gaseous secretions. The quantity of the secretions in the first class may be either increased or diminished, but we shall omit the consideration of *acrinia* for want of sufficient data to illustrate its causes and effects, merely remarking however that one of the first effects of irritation is to produce this state; and that in dissecting individuals who had presented various nervous symptoms during their disease, the only appreciable lesion of the head discovered was often an uncommon dryness of the cerebral membranes.

Hypercrinia constituting effusion.—Dropsies occur exclusively in the adipose and cellular tissues, and serous membranes. The fluid effused presents almost all the physical properties of the serum of the blood, of the bile, uric acid, extracto-mucous matter, an undue quantity of albumen, &c. The chief causes of dropsies are, 1, irritation of the organ affected; 2, sudden disappearance of another dropsy; 3, suppression of certain secretions; 4, alterations of the blood; 5, venous obstruction; and 6, a cachectic state of the system. The irritation may be seated in the part containing the effusion, or in adjacent tissues, and it (the irritation) may disappear, leaving the effusion, or persist till it, together with the effused fluid, is dissipated by appropriate means. On the sudden disappearance of a dropsy, if no evacuations take place by the excretories, it is apt to produce effusion into some other part, in the same way as the injection of water into the veins without drawing off an equivalent quantity of blood causes untoward symptoms. If the due quantity of the serous fluid of the blood be not eliminated from the cutaneous and pulmonary surfaces, as often happens in cold moist climates, (see Edward's *sur les influences des agens*, &c.) it is liable to be effused into the cellular tissue, serous membranes, or into the renal parenchyma, giving rise to dropsy or diabetes. The dropsy that so often occurs during the desquamation of the cuticle after scarlatina, may be attributed to the same cause. Dropsies may not only arise from a superabundance

of blood in the vascular system, as is shown by the attendant symptoms, but also from the habitual use of a scanty, insufficient diet, which impoverishes the blood and deprives it of its due proportion of fibrine, and again, they may arise from the introduction into the blood of the virus of certain reptiles and other poisons which take from it its property of coagulation and render it preternaturally thin. Venous obstruction is a common cause of dropsy; if it be in the vein of a limb, the œdema will be confined to that limb; if in the vena portæ or its branches, to the cavity of the peritoneum; and finally, if in the heart, the effusion will be general. We have no positive proof that an obstruction to the course of the lymph will produce this disease; probably the free manner in which the lymphatic vessels inosculate one with another, obviates the effect that would otherwise be induced. There are doubtless other causes of dropsy which are not appreciable in the present state of our knowledge. Such cases may arise as primary affections, or complicate various chronic diseases, and might even be supposed to depend on a morbid condition of the blood, but of this there is no positive proof, and the subject requires further investigation before we can come to a definite conclusion. Excessive secretions of fatty matter sometimes occur to the extent of being considered morbid. The disease may be either general or local in the form of tumours called lipoma.

Hypercrinia producing fluxes.—These discharges may come from membranes or from glandular tissues, and are bloody, serous, or merely an excessive secretion of the different fluids furnished by the secretory organs, as mucous, salivary, bilious, urinary, &c. These fluxes may be either acute or chronic, active or passive, continued or intermittent. The organ whence the discharge proceeds may present the following appearances; 1, a natural condition; 2, a remarkable colouring of tissue; 3, a sanguineous congestion, either active, passive, or mechanical; 4, different alterations of texture. Besides these alterations in the parts whence the flux proceeds, there may be, 1, irritation of the membrane on which the secretion is poured; 2, some modification of the nervous influence; 3, suspension of other secretions; 4, absorption of fluid from serous cavities; 5, elimination from the system of some foreign material taken by absorption. The reason why some diseases, as acute rheumatism, pulmonary tubercles in a state of suppuration, &c. are more prone to give rise to profuse fluxes from the skin, while in chronic gastritis this organ is remarkably dry, is not satisfactorily explained. Can it be that in pulmonary disease the cutaneous transpiration is a substitute for the suspended pulmonary transpiration?

Heterocrinia.—Several of the secretions, or their constituent principles, have been found at a distance from the organs which secrete them in a state of health, and eliminated by other organs. Fatty matter, in small globules, have been detected in the blood-vessels; cascum, a constituent of milk, has been detected in the urine, in the cavity of the peritoneum, and even as an ingredient of pus, where the mammary glands could not have formed it; cholesterine, a constituent of bile, has been found in almost every part of the body; uric acid in gouty deposits, and in the sweat and urea in the blood, in the excretions of the skin, mammary glands, &c. It would appear from all the facts of this kind on record, that the elements of all the secretions exist in various proportions in the blood, and that they are separated from it naturally by certain organs only by their peculiar construction; but that under certain circumstances, those elements are separated by other outlets than those through which they naturally pass. It may be conjectured that this metastasis of the secretory action arises from the blood containing an undue proportion of certain elements of secretion, which call for supplementary outlets for its elimination; or secondly, it may be thought that the elements are separated by the proper organs and afterwards reäbsorbed into the general circulation; and lastly, it may be attributed to the natural secretory organ being rendered unfit to perform its function, and thus other organs are called into action to afford an outlet to the accumulated retained elements.

Altered Secretions.—The plan of this work requires that the altered secretions of the different organs should be treated in the second part, when these organs shall come successively under consideration, and in this place we shall notice only the morbid productions which are formed in the place of the perspiratory fluid. It is not, however, always easy to distinguish this alteration from that of the nutrition of the part, and, indeed, they are not unfrequently combined. As the perspiratory fluid exists in every part of the body, the morbid secretion which takes its place may also occur in every part: thus it is that tubercle appears indifferently in parts the most distant and most differently organized. These productions of morbid secretions are of various form and appearance, solid or fluid, inorganic, increasing by juxta-position, or organic, growing by intussusception, and endowed with the properties and functions of vital matter. The inorganic products, composed for the most part of albumen and gelatin, are comprised in the following varieties: 1. Pus. 2. Tubercle. 3. Colloid matter. 4. Fatty matter. 5. Saline substances. 6. Colouring matter. The organic products, which are believed to consist

of the fibrinous element of the blood, poured out, coagulated, and concreted into various forms, may either form a part of the living solid, and be influenced by its actions; or be wholly detached from it, and maintain a separate individual existence. Of the first kind are false membranes, scirrhi, the different sarcomata, encephaloid and fungus hæmatodes. The other comprehends all the entozoa. The tissues in which these morbid productions are developed may present a natural healthy state, a state of active hyperæmia, a modification of the consistence of their molecules, a modification of their number, (hypertrophy or atrophy,) or contain a purulent secretion surrounding the accidental production. Different theories are entertained of their causes; some consider them as the result of atony; others refer them to a state of stimulus or irritation in the part; and a third party attribute their formation simply to a perversion of the natural actions of nutrition and secretion. We are of opinion that whatever tends to modify the natural process of interstitial secretion, tends likewise to create an accidental production. It is only in this way that irritation operates as an exciting cause; not because it *increases* the activity of the nutrition or secretion, but because it *deranges* these organic functions. There are in every individual certain peculiarities of constitution, which lay the foundation of the different temperaments, and which, by imparting a peculiar character to the innervation, hæmatosis, and all the different functions of nutrition and secretion, are the real and essential cause of the morbid productions under consideration. These peculiarities may be independent of the primitive organization, and may have been acquired from the influence of external agents. Thus, living in a cold, damp atmosphere, excluded from the sun's rays, produces such a modification in the general state of the system, that a disposition to the secretion of tubercles is formed in every organ. Thus, likewise, the same atmosphere causes an abundant development of entozoary animals in the alimentary canal, and in other parts of the body. We shall treat of these different productions in the order they have been mentioned.

Pus.—Several varieties of this secretion have been established, founded on physical alteration of properties. 1. Creamy homogeneous pus. 2. Curdy pus. 3. Serous pus. 4. Glairy muciform pus. 5. Concrete or lardaceous pus. These different kinds, so various in appearance, are found, when examined with a microscope, to be composed of globules floating in a serous fluid, which coagulate by heat, acids, or the muriate of ammonia. M. Gendrin considers the globules of pus to be similar to the globules of the blood, only larger, deprived of the colouring matter, and rendered of an opaque yellow

colour; which differences depend on the transformation the globules of the blood undergo in their conversion into pus. He endeavours to prove, by a number of experiments, that pus is nothing more than blood in a peculiar state of alteration, and that the globules of the blood escape from the capillaries in the state of pus, in consequence of some modification they are subjected to during the stagnation which the blood undergoes in certain degrees of active hyperæmia. The remarkable fluidity of pus from scrofulous ulcers he attributes to the excessive quantity of soda, and of the muriate of soda, which such pus contains. Pus has been found to contain a substance resembling the caseum of milk, which, if verified, might afford some explanation of the peculiar tendency of puerperal women to suppuration. Now, that it is well established that it does not require a breach of texture for the formation of pus, the knowledge of chemical reagents to detect its presence have very much lost their value, and we shall not, therefore, dwell upon them here. Pus has been found in every tissue in the body, in the blood itself, even where no suppurating point could be detected in the system, and also in the lymphatic vessels. Sometimes it exists infiltrated in the texture, in others, collected into an abscess, and often without any peculiar lesion which can be regarded as the cause of the purulent secretion.

Tubercle.—This term is employed to distinguish a yellowish-white body of rounded form, extremely variable in size, first hard and friable, but afterwards transformed into a soft heterogenous matter, composed of whitish, curdy masses suspended in a sero-purulent fluid. When the tuberculous matter is softened and evacuated, it leaves behind it an ulcerous cavity, which sometimes extends in every direction; in others, remains stationary for an indefinite time; and in others again, even cicatrizes. The origin of tubercles are not, as Baron and Dupuy maintain, necessarily vesicular; neither are they, in the first instance, grayish, semi-transparent granules, as Laennec supposes, or even minute deposits of pus afterwards concreting, as has been thought by Cruveilhier, though this last opinion is not without plausibility, for it is probable, that at the moment of deposition the tubercle is in a fluid state; but for the present we shall take it for granted, that in the first stage, tubercle is an opaque, friable, rounded body, of a yellowish-white colour, without organization. Whenever the secretion of tubercle has commenced, that process continues; each particle of living matter, instead of the perspiratory fluid usually separated from the blood, takes from it a particle of tubercu-lous matter by which the mass is increased. All tubercular matter then, is in this manner infiltrated among the tissues of the part. Af-

ter continuing in this crude state for an indefinite time, it is susceptible of transformation into purulent or cretaceous matter. The purulent transformation of tubercle is what has been termed its period of softening. This process consists in the tubercle acting on the tissues with which it is in contact like a foreign body, and causing a purulent secretion, which, mingling mechanically with the tubercle, separates its particles, and reduces its consistence to a clotted, fluid state, in which state is is commonly discharged. Sometimes, however, the tubercle, instead of softening, acquires an unusual hardness, and becomes transformed into a gritty mass. This arises from the reäbsorption of the animal matter, leaving behind it the calcareous deposit. As tubercle is produced by the perspiratory secretion, of which it appears to be a morbid alteration, it may be developed in every part of the body, but it is most usually secreted into the cellular tissue. It is, however, not unfrequently found in the lymphatic system, and in the mucous follicles. In adults they occur most frequently in the lungs, and next in frequency in the small intestines. In children they occur more frequently in other organs, without affecting the lungs, than in adults. They are very rare till the age of four and five years, when they produce greater mortality than at any other period. After this period is passed over, they become less frequent till after poberty, when they become very common, especially in the lungs, intestines, and lymphatic system, and continue so till about the age of forty. The predisposing causes of tubercle are still far from being well known. There is an especial tendency to their formation in individuals of very fair skin, with bright red cheeks, strongly contrasted with the blanched appearance of the rest of the countenance, blue eyes, light thin hair, and a soft, slender, muscular system, showing little contractile power; in whom the blood is serous, deficient in fibrin and colouring matter, and the mucous secretions predominate. Such individuals are very liable to sanguineous congestions, succeeded by chronic ulcerations and various disorganizations. They also preserve in adult age many of the characters belonging to childhood, for their organization is in a manner arrested. Such a constitution may likewise be acquired by external causes, as by living in an impure, moist, ill-ventilated atmosphere, excluded from the rays of the sun, and by being fed on unwholesome, scanty food, that does not sufficiently repair the forces of the system, or by excesses, which waste it, and debilitate the nervous energy. In short, the tubercular diathesis is induced by whatever hinders the proper development of the system, and irritation alone will not account for the production of the disease. We must, therefore, for the present,

be content to consider tubercle as the result of a modification or perversion of secretion, often attended or preceded by active sanguineuus congestion.

Colloid Matter.—This morbid secretion resembles glue, honey, or jelly, is of various colour without any trace of organization, and appears to be separated from the blood and deposited intu the different organic textures. Sometimes it is infiltrated into them; in others collected into a mass, and in one case it was found poured out into the pleuræ without any other investment. The cellular tissue in which it is infiltrated may be indurated, hypertrophied or otherwise altered.

Fatty Matter.—This may be of two kinds, either natural fat or altered in its physical and chemical characters.

Saline Substances.—It often happens that under the influence of causes, which are still far from beiog well known, various saline substances are formed or deposited in super-abundant quantities in different parts of the body. There is not a single part of the system where such saline concretions have not been discovered.

Colouring Matters.—The formation of colouring matter in the tissues is one of the most general phenomena presented in the organic kingdum. The white variety of the human race is that in which it least abuunds, but it not unfrequently occurs as a morbid secretiun and exhibits various characters. There are however only two species, the black and the yellow, melanosis and cirronosis which claim consideration.

Melanosis.—This name has been given to an accidental production whose distinguishing character is a black colour more or less intense. It may exist in fuur forms. 1. In masses, encysted or otherwise. 2. Infiltrated in different tissues like tubercle. 3. Spread out in layers on membranous organs. 4. In the fluid state, either pure, or mixed with other fluids. There is no trace of organization in melanic masses, neither are they often encysted, but they vary very much both in furm and size. According to Laennec, who considered them to be organized, after a time they soften like tubercle and are eliminated; but this process has been very rarely observed, and may even be questioned, further than as it occurs in the tissue mixed in and surrounding these masses. Infiltrated melanosis with induration of the tissue is that form of the disease which Bayle has considered as a species of phthisis, but we are inclined to view the induration as the result of chronic inflammation, and the deposition of the black matter into it an adventitious occurrence, not giving any peculiar character to the disease: thus in other instances the induration may be accompanied with all possible colours, red, bright gray, deep gray, or slate colour. Mela-

nosis in layers is most apt to occur on the free surface of the serous membranes; sometimes on their adherent surface, and also upon and under mucous membranes. The fluid form has been found in the stomach, secreted by its mucous membrane; also in the peritoneal cavity in chronic peritonitis; in one case in the urine, and in a fibrous cyst in the kidney of a horse. Chemical analysis has shown that this matter is composed chiefly of highly carbonized matter with albumen, fibrine, and other materials usually found in the blood. There is scarcely a tissue in which this accidental production has not been found, but it is much more common in some parts than in others, as in the lungs and lymphatic system. It has never however been found in the brain, though this organ naturally contains black matter in certain parts. It often tinges scirrhous and encephaloid tissues in the liver, stomach, breasts and testicles; has also been found to exist in minute portions in small arterial and venous vessels, and in one case to flow like ink from a cancer of the breast. Laennec has endeavoured to draw a line of distinction between this matter and the black pulmonary matter so common in old people, but in our opinion without any just foundation. All ages are liable to this formation, but it occurs most frequently in old age, as if the disposition to the formation of tubercles so prevalent in youth were replaced by the disposition of the secretion of melanic matter. Its frequent occurrence seems also to coïncide with that period when the pilous system becomes deprived of its colouring matter. The symptoms to which this affection gives rise have nothing peculiar about them. They depend on chronic irritation which often accompanies them; on the simultaneous existence of other accidental productions, or on the uneasiness which these masses may occasion mechanically, by compressing other parts.

Cirronosis.—This affection has been particularly noticed by Lobstein, in the fœtal state, and differs only in situation from the *icterus neonatorum* of authors.

Morbid secretions susceptible of organization.—Organizable matter of the serous surfaces.—The numerous varieties of form which this substance presents have been long known by the name of *false membranes.* They are composed of concrescible fibrine and an albuminous fluid contained in cells. It has been a question whether their vascularity was derived from the adjacent membrane, or existed independent of it. We are of opinion both theories are correct: for they will be found to contain vessels communicating with the adhering part, and also blood not contained in vessels, and which vessels do not communicate with the surrounding tissues. There are three states through which these substances pass. In the first they exist as coagulable

amorphous masses without trace of organization; in the second they become organized and vascular; and in the third they possess all the properties of cellular tissue or serous membrane, are obnoxious to various morbid derangements, as hyperæmia, the exhalation of blood, secretion of pus, tubercle, &c. and may be transformed into fibrous, cartilaginous or osseous tissue.

Organizable matter of the tegumentary surfaces.—A substance capable of coagulating spontaneously, is sometimes deposited on the free surfaces of the mucous and cutaneous membranes. Sometimes it extends in a membraniform layer, over a portion of mucous membrane in a state of irritation, and in others closely unites the opposite surfaces of membranes accidentally in contact. It has been doubted whether they ever become vascular, but M. Guersent has traced vessels in the false membranes of croup, anastomosing with the mucous membrane beneath. They often become detached by the secretion of a fluid, by the mucous membrane under them.

Organizable matter of the vascular system.—Whenever the circulation ceases in a vessel, the internal surface of that vessel tends to become the seat of an exhalation, producing that same organizable matter—of which we have already followed the formation on the serous—mucous—and cutaneous surfaces—and obliterates its cavity.

Organizable matter of accidental surfaces.—When any tissue has suffered a solution of continuity from both surfaces of the wound, it exhales a matter which, like those just examined, becomes solid, organized, and vascular, and is thus converted into a genuine tissue.

Organizable matter deposited in the tissues of various parts of the body.—These productions, infinitely varied in their physical appearance, are all either organized, or have a tendency to become so. Some of them are homogeneous in their texture, resembling coagulated fibrine, or possess the hardness of fibrous or cartilaginous matter, or merely the consistence of cerebral pulp. Others again are of heterogeneous composition and texture, consisting of different component particles, with structures, filamentous, areolar, lobular, or cellular, containing fluid matters. In some cases the organizable morbid production consists of a reddish, flesh-like tumour, traversed by numerous vessels: this is the *vascular sarcoma* of Abernethy. If some contain cells, with exceedingly vascular parietes, and filled with a serous fluid: this is his *cystic sarcoma.* When it presents a granulated appearance, he calls it *pancreatic sarcoma.* When it appears as a grayish or whitish substance, without trace of vessels or of blood, and often divided into regular lobules by something like fibrous in-

tersections, of sufficient hardness to grate under the knife, it is called *scirrhus*, so that scirrhus may be of two kinds, either a simple alteration of nutrition of the cellular tissue, or a morbid secretion. When the production resembles cerebral pulp, just as it begins to soften, containing either vessels or blood alone, it is called *encephaloid matter*, or *medullary sarcoma*. Different alterations and productions have received the name of *fungous hæmatodes*. Sometimes it is accidental erectile tissue, in other cases vascular sarcoma, medullary sarcoma, &c. *Cancer*, in the author's opinion, is not a distinct morbid alteration, but the name is applied to every lesion, whether of nutrition or secretion, that has reached the period when it terminates in an ulcer, constantly extending its ravages either in depth or surface.

Entozoa.—This term is applied to animals generated within the body, which possess a separate individual existence. Those introduced from without, are called *ectozoa*. The entozoa have distinct habitations; some of them reside in cavities, others in the parenchyma of organs; the *ascaris lumbricoides* are found only in the intestinal canal, the *strongylus* chiefly in the urinary passages, the *fasciola hepatica* in the liver, the *filaria* in the cellular tissue. They exhibit three principal varieties of form; 1, cylindrical; 2, riband-shape; 3, vesicular. Their organization is very variable; some consist merely of a parenchymatous mass, without distinct cavity, or very perceptible organs, others resemble a bladder filled with water, whilst others again show a more complicated organization, possessing a muscular system, an alimentary canal, organs of generation, and rudiments of a circulatory and nervous system. Cuvier divides them into two classes, the *cavitaria*, which possess a digestive tube, and the *parenchymatosa*, which are destitute of this organ. The former comprise the *filaria*, *ascaris*, *strongylus*, *trichocephalus*, and the *oxyuris;* the latter the *acanthocephala*, *trematoda*, *cestoidea*, and *cystica*. In this place we shall treat only of the cystica, the hydatids of authors. They occur in almost every part of the body, in the parenchyma of organs, in mucous, serous, or vascular cavities, and in the free cellular tissue. One class of them consists of a simple bladder, filled with a clear fluid, without appendix of any sort, denominated *acephalocyst*. The other class, the cephalocyst, may have one or more heads, or a simple retractile appendix, the *cysticercus* of Laennec. They may arise as the other productions we have spoken of, from irritation, which deranges the natural mode of nutrition and secretion, and thus act as an accidental agent. It is remarkable, that the entozoa have a peculiar tendency to be developed and to increase

when the external agents are such as to prevent the complete development of the process of nutrition in the different tissues. As if the organic particles thus prevented from perfect assimilation, proceed to derange themselves so as to produce an inferior being, an entozoon. In fact, they occur most frequently in moist countries, and from the use of poor watery diet. They may be produced almost at will in animals, by keeping them in damp, confined habitations, excluded from the sun: There is, however, one species, the *dracunculus*, which forms an exception to the rest, being exclusively confined to dry and torrid countries.

Gaseous secretions.—The system in the healthy state constantly exhales gases from the cutaneous surface, the alimentary canal, and the lungs, and it is probable that in many diseases, these secretions are greatly modified. It has been thought that gravel, or the excessive formation of uric acid, is often caused in cold and moist climates by the diminished exhalation of azotic gas from the lungs. The gaseous secretion may present alteration, either in the quantity or quality of the gas exhaled, or they may occur in certain parts that do not naturally secrete any such. The consideration of each kind falls under notice in the special pathology.

Lesions of the Blood.—The alterations of the fluids should be studied, 1, in the blood; and 2, in the different humours which concur in forming the blood, or which emanate from it. The qualities of the lymph and chyle especially exert a direct influence on the state of the blood; but a modification of the other humours also tends to alter its qualities as they draw their constituent principles from it. The blood while circulating seems to be under the influence of two forces; one imparts intestine motion to each of its globules, and maintains them at a certain distance from each other, while the other tends to bring the blood to a state of repose, and is exerted in the organic parenchyma, at the point of contact of the solids and the blood. If we analyze the blood and the solids, we discover the same proximate principles in both. If we examine their physical structure, we find it identical, both consisting of globules mixed with an amorphous substance. No line of demarcation can therefore be drawn with strictness and precision between the blood and the solids with respect to their vital phenomena, internal structure and chemical composition. Physiologically speaking, we cannot conceive one to be affected without the other. On the one hand, the blood nourishes the solids and maintains their life, and on the other the solids contribute to *make* the blood in the actions of absorption, digestion, arterial circulation, and respiration, and to *unmake* it in the action of venous circulation,

secretion, and nutrition.* Analysis has shown the blood to be chiefly composed of fibrine, albumen, and a peculiar animal matter to which it owes its colour. When drawn from a healthy person, it separates into a solid portion—fibrine and colouring matter, and into a fluid portion consisting of albumen and water; but in many morbid states it exhibits different appearances which constitute so many pathological conditions. The fibrine may be altered either in quality or quantity. When the fibrine abounds, the clot is large, leaving very little serum, and is also dense, affording little albumen on pressure, but in some instances the clot is large, from the quantity of serum it contains, and might thus be thought to exhibit a superabundance of fibrine, did we not press it and force out the serum. Impoverished blood, on the contrary, contains an undue quantity of serum and a small soft coagulum; and here again we are liable to error, for the smallness of the coagulum may be only apparent, and arise from the firmness with which it has coagulated. The force that maintains the blood in its fluid state may be so modified to allow it to coagulate spontaneously in its vessels. Sometimes it takes place without any known cause, and in others seems to accompany a state of irritation in the parietes of the containing vessel. These polypous concretions often display marks of vitality. An opposite state of the blood, when it loses its power of coagulation altogether or coagulates very feebly, has often been met with, and can be traced to various causes, as the introduction into the circulation of various poisons, viper virus, miasmatic exhalations, &c. It may also arise from electricity, running down animals; and from the debilitating effects of disease, diet, &c. Another remarkable alteration the blood exhibits, is the formation of a whitish or yellowish layer on its coagulum, which has been found to contain an undue quantity of albumen, and to bear some analogy to false membranes. This buffy appearance of the blood occurs in certain inflammatory diseases, during the state of pregnancy, and under some circumstances not appreciable. The albumen is commonly increased to twice its natural quantity in an inflammatory condition of the system, rendering the serum quite viscid, and nearly all of it convertible into a firm mass on the application of heat. The mucous layer that has sometimes been observed at the bottom of the serum or suspended in

* It is thus rendered both in the original and the translation, and we are not quite certain that we apprehend the precise scope of the context. We should think it would be more correct to range the arterial circulation in that category of functions which is concerned, to use the author's own expression, in *unmaking* the blood and composing the solids; and the reverse of the venous circulation.—Rev.

it like a cloud is doubtless altered albumen, but its cause is not well understood. In two cases of this sort there was extensive collections of pus in the system. That the blood is often equally altered and vitiated in disease, is proved by a number of experiments and well-attested observations. The blood taken from a person labouring under putrid fever, and introduced into the system of an animal, has induced violent symptoms, gangrene, and death. The same has occurred from using the blood of a small-pox patient, or the blood of animals affected with malignant pustule or carbuncle. It also becomes surprisingly altered, and rendered unfit to maintain the system in a healthy state, as in scurvy; from the long-continued use of certain mineral poisons, as mercury, and in persons who have been constrained to support existence by resorting to insufficient unwholesome nutriment which impoverishes the blood, renders it little more than serum, and gives rise to dropsical effusions. The mutual influence which the blood and nervous system exert over each other, is little understood; still in the capillary system where the blood comes in contact with the solids, and where, in conjunction with the nerves, it gives life to the organs it traverses, the whole are linked in mutual dependence, and the nerves must act on the blood as the blood acts on the nerves. Dupuytren proved long ago that cutting the pneumo-gastric nerves prevents the venous blood from being converted into arterial in the lungs; and Mayer says that by tying them in animals, the blood in the pulmonary system coagulated. The many diseases that are connected with and arise from a morbid state of the blood, form an interesting subject of inquiry, and claim our serious consideration; still in the present state of our knowledge, we must be cautious that we do not confer on what may be as yet only hypothetical, the force and importance of well-established facts.

Lesions of Innervation.—In every disease not immediately produced by external violence, the symptoms that occur depend on a lesion of the forces that animate every living part, (innervation,) or on a lesion of organization. The former is primary and constant; the latter is secondary, variable in its nature, and inconstant in its existence. How often do we observe various disorders of the digestion, circulation, respiration and secretions, without being able to discover by dissection the least derangement in the organs that execute these functions? Still more frequently the examination of the nervous centres will not reveal to us the cause of the different disorders of animal life. There are certain morbid states in which the physical laws tend to resume their empire before the extinction of life, and this diminution of resistance to the affinities of inorganic matter gives rise to a

train of phenomena commonly called *putrid symptoms.* Perhaps we shall be able, at some future period, to explain by lesions of organization those remarkable phenomena, but until then let us consider them as the external manifestation of a lesion of the vital powers themselves, and let us call them *lesions of innervation.* The existence of general derangement caused by sympathetic action, may be referred to either an excitation of the vital forces, their reduction below the regular standard, or to their perversion. Hence the production of three fundamental dispositions, the *hyper-adynamic*, the *adynamic*, and the *ataxic*, which impress on disease their peculiar character and regulate its course. To determine the predominance of one or the other of these dispositions, to estimate their influence and ascertain the mode of treatment they require, is the province of the physician; but it is sufficient for us to have pointed out the path to be pursued; to treat of these subjects would be to quit altogether the domain of pathological anatomy.

We have little space left for remark of any sort, but there is one point we cannot pass by unnoticed. The prominent, we might perhaps say, the only glaring fault of the work, is the reluctance of the author to admit the paramount agency of irritation in the production of disease. He even refuses to treat of inflammation as a separate morbid condition, and endeavours to supply its place by the exclusive consideration of its elements, as hyperæmia, morbid secretion, &c. which he gives as original independent conditions, without attempting to trace them to any adequate cause, at least in very many cases. He can perceive only hyperæmia, where others can demonstrate irritation and even active inflammation, thus entirely overlooking the first and all-pervading attribute of living matter to enter into action on the application of stimuli, and to cause a fluxion of the circulating fluids to a part irritated. Whenever the irritation is not plainly demonstrable in its causes or effects, that is, either in the ascertained presence of a stimulus, or in the evident appreciable results of inflammatory action, he stigmatizes the doctrine as applied to all such cases as hypothetical, although he himself has recourse to an explanation which he confesses to be in many instances equally hypothetical. This hyperæmia, this new element of a morbid condition, as it is considered by Andral, if it be not referred to irritation as its cause, must arise either from a mechanical impediment to the circulation, a local debility in the part affected, or from an impoverishment of the blood; neither of which causes can be thought to be present in very many cases. Seeing these to be insufficient and often not present, how is the occurrence to be accounted for if it be not re-

ferred to irritation? Andral, throughout the work, constantly endeavours to elude the question, and to explain away a doctrine he cannot refute by sufficient facts and arguments, by such expressions as the following. "Irritation can only be considered as one of the elementary principles of the phenomenon." p. 10. "Irritation gives the impulse to the aberration of nutrition, but does not produce it." p. 282. "The only effect which can rationally be attributed to irritation, is the tendency to deviation from the natural type which it produced in the function of nutrition." p. 336. "That irritation may be the exciting cause of every species of alteration, both of nutrition and secretion; but that, of itself, it is incapable of producing any one of them." p. 411, &c. Although we are ourselves firm believers in the doctrine of irritation as taught by the physiological school of medicine, we do not much complain of this backwardness of Andral to admit its principles and precepts. His wary and sagacious mind is admirably calculated to clear up the obscurities that have so long involved pathological science, and however the scruples of himself and other eminent cultivators of pathological anatomy may somewhat retard the general adoption of a system of medicine founded on physiological data, their researches are preparing the way in the best possible manner for the final triumph of these doctrines.

Here we close the general anatomy, and conclude the first volume, which is complete within itself, and the most susceptible of analysis. If circumstances permit we may take up the second volume in the succeeding number. In the mean time we will barely remark, that the translators deserve the thanks of the profession for the very able manner in which they have executed their task; and we hope that the work may be republished in this country, that all classes of the profession may be enabled to become familiar with its pages.

New York, January, 1832. C. D.

Art. X. *The Library of Practical Medicine; published by order of the Massachusetts Medical Society for the use of its Fellows.* Vol. I. Containing a Treatise on Fever. By Southwood Smith, M. D.; and Clinical Illustrations of Fever. By A. Tweedie, M. D. Simpson and Clapp. Boston, 1831.

We have on a former occasion given some account of the history, and of the institution of the Massachusetts Medical Society. We